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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,745	12/08/2003	Peidong Yang	UC03-118-3	5099

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JOHN P. O'BANION
O'BANION & RITCHEY LLP
400 CAPITOL MALL SUITE 1550
SACRAMENTO, CA 95814

EXAMINER	
RAO, G NAGESH	
ART UNIT	**PAPER NUMBER**
1722	

DATE MAILED: 03/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/731,745	YANG ET AL.	
	Examiner	Art Unit	
	G. Nagesh Rao	1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-23 and 25-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-23 and 25-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1) The indicated allowability of claims 4-5, 8, 24, 13-22, and 30-35 are withdrawn in view of the newly discovered reference(s) to Empedocles (US Patent No. 6,962,823). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2) Claims 2-23, 25-29, and 30-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoffman (US Patent No. 5,352,512) in view of Empedocles (US Patent No. 6,962,823) which has support from an earlier claim of CIP benefit to provisional application 60/370,113 (enclosed for verification and support of subject matter).

Hoffman discloses a method of making tubes of 5 nanometer (nm) or greater diameter. The wall thickness is about 1nm or more. The material of the tube can be polymer, ceramics, metals. These tubes are formed on fibers of carbon, glass, or other fibers (See Abstract). In Col. 1 Line 55-60, these materials include silica, carbon, carbides, oxides, nitrides. Oxides or high temperature oxides are the preferred materials for the tubes (Col 2 Lines 15-20). Others are given in Col. 2 Lines 50-67 as ferrous metals, non-ferrous metals, boride, semiconductors, and diamond. The fibers are fixed in a preform configuration and held rigidly in that configuration (Col 2 and Col 3). Then the fibers are cleaned and then coated. Then, the fibers are removed by gas phase or liquid phase etching. The tube material is not destroyed by the techniques used to remove the fiber. The fibers are described as carbon or graphite in Col. 4 Lines 65+ and as quartz or polymer in Col. 5 Lines 1-10. In Col. 5, the coating of the nanotubes is suggested. Thermal oxidation

ranging from 800-1000^{0}C temperature range is disclosed in Cols 3-4 Lines 38-68 and 1-68 as well in Col. 6 Lines 50-65.

Thus the method of forming a nanotube (i.e. a tube of nano-size) by deposition of a material over a nano-wire (i.e. a nano-sized fiber) and then removing (i.e. sacrificing) the nano-wire to form a nanotube (i.e. a longitudinal segment) comprised of the material is anticipated by Hoffman 512. Additionally, the nano-wire is used in Hoffman as a form for the nanotube and thus the nano-wire anticipates the used of a sacrificial template for the nanotube. Also anticipated are the carbon or graphite fibers (i.e. the group IV element group Carbon) and polymers used as the nano-wire material. Forming multiple layers (i.e. multiple longitudinal segments) by coating the nano-tubes is also disclosed. Forming the tube material by oxidation of the wire is also disclosed (Col. 6 Lines 50-65) and thus anticipated by Hoffman 512.

However Hoffman 512 fails to explicitly teach or suggest that the nanotube having a single crystal structure by using single crystal structured nano-wires as a template or an array of the sort.

Empedocles 823 pertains to a method for making, positioning, and orienting nanostructures, nanostructure arrays, and nanostructure devices. Therein enclosed in the specification of Empedocles 823 are the specified teachings of utilizing a

single crystalline nano-structured nano-wire (See Col 16 Lines 10-30) that which would be embodied along with for a nano-structured array and template (See Col 17 Lines 41-61). These templates and arrays are utilized in an efficient manner of production for the fact that the end result of these techniques are advanced nano-devices in the electrical and bio-nano art.

Furthermore Empedocles 823 teaches in its definition section a variety of well known materials that can be used for the nano-structured devices which by the way encompasses both nano-wires and nano-tubes. The choices of materials include the use of materials such as ZnO, GaN, Si, Ge, Ag, Au, Groups II-VI materials, elemental group IV materials, and metals (See Col. 15-16 Lines 1-68). Finally Empedocles 823 teaches that it is well known to use Gas and Plasma Phase Continuous Reactor for Nanostructure Synthesis, which would encompass the use of precursors, via CVD techniques, such as ammonia or trimethylgallium fed along with argon and nitrogen gas carriers, as well the specified temperature reactions range around 400-500^{0}C but that does not mean that the CVD processing parameters would not or could not be capable of being altered to 600-700^{0}C considering the closeness of temperature range (See Col. 40 Lines 34-68, Cols. 41-42 Lines 1-68).

Therefore it would be obvious at the time of the invention to one with ordinary skill in the art to employ the processing, growth, and apply the knowledge of known materials capable of being used of Empedocles 823 to that of Hoffman 512 in order to optimize and create better processing techniques for fabrication of these nano-tubes via a sacrificial nano-wire template in order to obtain a product suitable for nano, bio, and quantum electronic devices.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to G. Nagesh Rao whose telephone number is (571) 272-2946. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on (571) 272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GNR

ROBERT KUNEMUND
PRIMARY EXAMINER